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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/917,127 | 07/27/2001 | Larry D. Kinsman | 3572.1US (97-1243.1) | 3326 |

24247 7590 07/19/2002

TRASK BRITT
P.O. BOX 2550
SALT LAKE CITY, UT 84110

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| EXAMINER |
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TRINH, MICHAEL MANH

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| ART UNIT | PAPER NUMBER |
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2822

DATE MAILED: 07/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/917,127

Applicant(s)

KINSMAN ET AL.

Examiner

Michael M Trinh

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

*** This office action is in response to Applicant's amendment filed on January 09, 2002.

Claims 1-27 are currently pending.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (c) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claims 1-3,6,9,10-17,23,26 are rejected under 35 U.S.C. 102(e) as being anticipated Ohuchi (6,107,164).

Ohuchi teaches a method for forming a semiconductor device comprising at least the steps of: providing a semiconductor substrate 10 having an active surface including at least a layer 2 of integrated circuit, with a plurality of die, with plurality of bond pads 3 with each die; forming intermediate conductive elements 4 of wiring (Fig 1; cols 3A-3D) over the bond pads to project a height over the active surface; forming a pattern of mutually traverse channels 22 to depth below the layer and circumscribing a die and exposing peripheral edges of the circuit device (Fig 3B; col 3, lines 9-45) ; applying an encapsulant material 23 (Fig 3C) over the channels and dies to a depth exceeding the height of the projection; and removing the encapsulant material 23 by polishing planarization to expose the conductive elements (Fig 3D; col 3, line 30 through col 4); and forming an external conductive elements 5 over the intermediate conductive elements 4 (Figs 4), wherein the conductive elements comprising conductive aluminum, wherein the external conductive elements comprising solder balls, wherein the encapsulant material is resin,

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Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 4-5,7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi (6,107,164).

Ohuchi teaches a method for forming a semiconductor device as applied above to claims 1-3,6,9-17,23,26, and fully repeated herein.

Ohuchi show the channels having U-shape having parallel sidewalls, while claim 4 recites sloped sidewalls, wherein the channels are formed by sawing, laser, isotropic or anisotropic etching (claims 5,7).

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the channels of Ohuchi to have a U-shape or V-shape as well known in the art because of the substitution of art recognized equivalent channels for facilitate of dicing to form individual dies. Re further claims 5,7, sawing, laser, isotropic or anisotropic etching are well known process and proven in the semiconductor art to form the channels in the semiconductor substrate effectively. Re further claim 8, forming the encapsulant material over the substrate by transfer molding as well-known would have been obvious to one of ordinary skill in the art because of the desirability to conformally sealing the substrate with a resin.

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5. Claims 18-22,24,25,27,15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi (6,107,164) taken with Brooks et al (5,824,569) and Heo (5,908,317).

Ohuchi teaches a method for forming a semiconductor device as applied above to claims 1-3,6,9-17,23,26, and fully repeated herein.

Re claims 19-22,24,25,27, Ohuchi lacks to flip chip bond the semiconductor substrate to a carrier substrate having conductive bumps. Re claim 18, forming encapsulant material in the back of the substrate.

However, Brooks '569 teaches (at Fig 6) to flip chip bond and align the semiconductor substrate having the conductive element to conductive bumps formed on a carrier substrate. Re claim 18, Brooks also teaches (at Figs 3-5) to form encapsulant material 36A in the back of the substrate 30. Heo teaches (at figs 7A-8; col 7) to align conductive elements 20 to conductive bumps formed on a carrier substrate 40.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to align the conductive elements of the semiconductor device of Ohuchi to conductive bumps formed on a carrier substrate as taught by Brooks and Heo. This is because of the desirability to package the chip on a PC board by flip chip techniques.

Employing alternative well known materials as recited in claim 17 in forming the encapsulant materials would have been obvious to one of ordinary skill in the semiconductor art, wherein resin is taught by Ohuchi, wherein siloxane polyimide, epoxy novolac based materials are taught by Brooks (col 3, lines 39-42).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (703) 308-2554. The examiner can normally be reached on M-F from 8:30 Am to 4:30 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Whitehead Jr Carl can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Oacs



Michael Trinh
Primary Examiner